

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
WATER AND SEDIMENT CONTROL BASIN

(No.)

CODE 638

DEFINITION

An earth embankment or a combination ridge and channel generally constructed across the slope and minor watercourses to form a sediment trap and water detention basin.

PURPOSES

A water and sediment control basin may be established to:

- Improve farmability of sloping land
- Reduce watercourse and gully erosion
- Trap sediment
- Reduce and manage onsite and downstream runoff
- Improve downstream water quality

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to sites where:

1. The topography is generally irregular.
2. Watercourse or gully erosion is a problem.
3. Sheet and rill erosion is controlled by other conservation practices.
4. Runoff and sediment damage land and improvements.
5. Soil and site conditions are suitable.
6. Adequate outlets can be provided.

Water and sediment control basins shall not be used in place of terraces. Where a ridge and/or channel extend beyond the detention basin or level embankment, standards for Terrace (600) or Diversion (362) must be applied as appropriate.

CRITERIA

General Criteria Applicable to All Purposes

The resource management system must reduce soil loss in the interval above and below the

basin to prevent excessive maintenance and operation problems.

Where land ownership or physical conditions preclude treatment of the upper portion of a slope, a water and sediment control basin may be used to separate this area from, and permit treatment of the lower slope.

The design must limit inundation, infiltration, and seepage to prevent crop damage and/or other problems.

Laws and Regulations. This practice must conform to all Federal, State, and local laws and regulations. Laws and regulations of particular concern include those involving water rights, dam construction, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

Spacing. Water and sediment control basins must generally be spaced at terrace intervals (see standard for Terrace (600)). Adjust spacing or include other measures needed to prevent erosion in the watercourse between basins.

The system of basins and row arrangements must be parallel and spaced to accommodate farm machinery where needed to fit row crop spacing. Spacing design must consider embankment slope lengths, top width, and outlet location.

Cross section. For portions of the basin controlling only flowing water 3 feet or less deep, embankment slopes must be two horizontal to one vertical, or flatter. For all other portions of the basin, sum of the upstream and downstream slopes must be 5:1 or flatter with a maximum of 2:1 in either slope. Slopes may be vegetated or flattened to permit cropping.

Earth Embankment. Minimum effective top widths are given in Table 1. Constructed embankment height must be at least 5% greater than design height to allow for settlement.

The maximum settled height of the embankment must be 15 feet or less measured from natural ground at centerline of the embankment.

Table 1. Minimum Top Width of Embankments

Fill Height (feet)	Effective Top Width (feet)
0 – 5	3
5 - 10	6
10 –15	8

Foundation cutoff and seepage control.

Portions of basin ridges designed to impound more than a 3-foot depth of water must include foundation cutoff and seepage control as required by the standard for Pond (378).

Capacity. Basins must have capacity to prevent overtopping by runoff from a 10-year frequency, 24-hour duration storm. Larger design storms may be used where needed for flood control or other purposes.

The following table can be used to estimate the sediment in inches/10 yrs. vs tons/ac./yr. (based on the tons/ac./yr. from the Universal Soil Loss Equation (USLE)):

Sediment Storage			
Tons/Acre/Year	Inches in 10 Years	Tons/Acre/Year	Inches in 10 Years
2	0.14	8	0.55
3	0.21	10	0.69
4	0.28	12	0.83
5	0.34	14	0.96
6	0.41	16	1.10
7	0.48	18	1.24

The storage volume may be reduced by:

- (1) Flood routing the release.
- (2) A volume in acre-inches equal to three times the release rate in cfs, where 3 is a constant for conversion of the cfs release rate to acre-inches for the peak runoff portion of the storm.

The following table may be used for (2) above:

Duration of Flooding	Design Outflow	Water Storage
(hrs removal time)	(cfs/ac-in of runoff)	(fraction of total runoff to be stored)
6	0.10	0.70
12	0.070	0.79
18	0.050	0.85
24	0.037	0.89
36	0.026	0.92
48	0.020	0.95

In addition to the above storage, basins must have capacity to store at least the anticipated 10-year sediment accumulation, or periodic sediment removal must be provided to maintain the required capacity.

Basin ends must be closed to an elevation that will contain design capacity. Freeboard may be added to design height to provide for safe operation of auxiliary spillways. Auxiliary spillways must not contribute runoff to a lower basin (or pond) except where the lower basin (or pond) is designed to control the flow.

Outlets. Water and sediment control basins must have spillways, underground outlets or soil infiltration outlets that conform to standards for Pond (378), Grassed Waterway (412), Diversion (362) or Underground Outlet (620) as appropriate.

Topsoil. Where necessary to restore or maintain productivity, topsoil must be stockpiled and spread over disturbed areas.

Vegetation. Disturbed areas that are not cropped must be established to appropriate vegetation or otherwise protected from erosion using organic or gravel mulch or other measures.

Selection of vegetation species must consider environmental quantity and quality, endangered species needs, and wildlife food and habitat needs. Seedbed preparation, fertilizing, seeding, and mulching must be in accordance with standards for Critical Area Planting (342) and Mulching (484).

CONSIDERATIONS

Water and sediment control basins should be part of a resource management plan including such practices as terraces, grassed waterways, contouring, a conservation cropping system, conservation tillage, and crop residue management.

Where possible, the basin should be configured to enhance sediment deposition. This can be accomplished by using flow deflectors, inlet and outlet selection, and by adjusting the length to width ratio.

For cropped fields, embankment orientation and crop row direction should be approximately perpendicular to the land slope to support

contour farming. The design should support farmability by limiting short point rows or sharp curves. Field boundaries and row lengths should also be considered in planning basin location and row direction

Effects on streams and wetlands must be considered. Mitigation may be required where water is diverted or degraded for downstream uses.

This practice can be used to develop/enhance seasonally ponded areas for migratory waterfowl.

Where possible, the design should enhance habitat for native and endangered species. Effects on downstream water quality and temperature may be critical for some species.

This practice may adversely affect cultural resources. Planning, installation and maintenance must comply with GM 420, Part 401.

Operation safety of vehicle and farming equipment should be considered when selecting cut and fill slopes, especially where cropping or haying is planned.

PLANS AND SPECIFICATIONS

Plans and specifications for installing sediment and water control basins must conform to requirements of this standard and must describe requirements for applying the practice and achieving its intended purpose.

OPERATION AND MAINTENANCE

A site specific O&M plan must be prepared for and reviewed with the landowner or operator. The plan shall contain guidance to maintain the embankment, design capacity, vegetative cover and outlet.

All plans shall include a provision that after each large storm, basins must be inspected and needed maintenance performed. When sediment storage is full, accumulated sediment must be removed or the basin must be redesigned and modified to restore capacity.

Where designs include underground outlets, O&M plans should include checking for clogging and/or pipe damage.